REMARKS/ARGUMENTS

The specification has been conformed to correspond to the preferred format for U.S. patent applications as required in the Office Action, and a Substitute Specification and Comparison Copy are submitted herewith.

Claims 1-33 are presently pending in this application.

Applicant has noted the provisional obviousness-type double patenting rejection of the claims over copending applications Nos. 10/054,516 and 10/054,119. Applicant will file appropriate terminal disclaimers in this or the other applications once patentable subject matter has been identified in at least two of the applications.

All claims were rejected for obviousness over the primary reference, Baskins (4,549,080), alone or together with Wieboldt (4,914,297) and, with respect to claim 28 only, over Baskins in view of Shu-Ti Lee (4,684,805) and Bragg (4,749,276).

Baskins was viewed as disclosing the claimed probe except for releasably mounting the optical window and/or the retroreflector, using springs to mount the optical elements (which was viewed as taught by Wieboldt) and the provision of a bellows in such probes, which was viewed as taught by Shu-Ti Lee as well as Bragg.

As is discussed in more detail below, the presently pending claims, as originally filed and/or as herewith amended or newly submitted, are directed to the structural details of the probe which render it particularly adapted for use in the harsh environment of exhaust ducts and chimneys, and render the probe relatively inexpensive to manufacture and easy to maintain, thereby eliminating frequent service and downtimes. This is accomplished with the structural features recited in the claims.

The Baskins patent discloses a flue gas analyzer with the capability of generating signals proportional to CO concentrations independent of comparatively high concentrations and absorption strengths of carbon dioxide and water vapor. In this context, Baskins has devised microprocessors that can readily handle the data from multiple channels for CO, water vapor and

carbon dioxide. With no need to treat a second gas as an interferent, two or three gases in spectral proximity are readily detected (col. 2, lines 26-37 of Baskins). While Baskins contains much disclosure concerning electronic calibration, signal and data processing, it devotes little to disclosing the structural details of the probe other than two drawing figures which just show sufficient to follow the operation of the instrument without disclosing significant structural details. As a result, Baskins alone, or when combined with the secondary references, fails to suggest to one of ordinary skill the features of the claims in this application, thereby rendering the claims not obvious and patentable, as is discussed below.

The present invention, as defined by the claims, particularly independent claims 1 and 29, is a probe that has an elongate hollow structure defining first and second ends and an optical cavity between them and within a side wall of the hollow structure.

A mounting structure including a mounting flange is provided at the first end for mounting the elongate structure within a duct or chimney. A support member is provided at the second end, and a connecting structure in the form of the tie rods connects the mounting structure to the support member at the second end.

An optical window at the first end of the elongate hollow structure permits a light beam from an optical analyzer to enter the optical cavity and to travel from the first end to the second end of the hollow structure. A filter (see Figs. 1B and 1C) forms a part of the side wall. The filter permits a gas passing through the duct or chimney, but not particulates in the gas, to enter into the optical cavity. A retroreflector at the second end of the hollow structure returns the light beam to the first end.

Claim 1 requires the optical window and the retroreflector to be releasably mounted at the respective ends of the elongate hollow structure.

The independent claims require that the optical window and the retroreflector, as well as the filter, be releasably mounted so that they can be exchanged. This is important because the probe of the present invention is for use in applications that are subject to a wide temperature range, for example from 50°C to 450°C, which requires different optical

characteristics as is discussed in the last paragraph on page 2 and the first two paragraphs on page 3 of the specification as originally filed. The probe of the present invention is constructed to facilitate such interchanges of the optical window, retroreflector and filter.

Thus, these components of the probe must not only be capable of being readily interchanged, it must be possible to carry out such a change in a way which avoids difficulties in aligning the retroreflector relative to the optical window.

The independent claims require that the filter module be removable sideways from the connecting structure, i.e. generally transverse to the length of the hollow structure, so that it can be exchanged as a whole or be specially cleaned should the filter forming part of the filter module become clogged for some reason. To effect such a filter module exchange, the independent claims require that the connecting structure connects to the mounting structure at one (the first) end and to a support member at the other end. Thus, the filter module can be removed without involving movement of either the mounting structure or of the support member.

This is particularly important because it permits an exchange of the filter module without disturbing the position of the optical window, which is releasably mounted between the mounting structure (e.g. flange 44) and the filter module. Equally, the retroreflector is releasably connected to the support member, and its position also does not need to be changed when the filter module is removed. Thus, removal and exchange of the filter module does not affect the alignment of the optical window and the retroreflector. The required alignment of these two optical components is maintained even when the filter module located between them is removed and replaced with another module.

Moreover, because the optical window is disposed between the mounting structure (flange 44) and the filter module, it can be easily accessed and removed and replaced once the filter module has been removed by releasing its connection to the (fixed) support member.

In addition to this ready sideways interchangeability of the filter module, the optical window and the retroreflector, independent claims 1 and 29 require the provision of first

and second heaters associated with the optical window and the retroreflector, respectively. They heat the window and reflector to a temperature at which a possible condensation of vapors present in the stack gases is of no concern because they prevent the formation of condensation, which could completely falsify the measurements should such condensation occur. Although Baskins discloses the use of a heater, Baskins' heater is not associated with the optics of the probe, such as the optical window or the retroreflector, to prevent the formation of condensation thereon. Instead, in Baskins the heater is associated with the filter in the analyzer part of the instrument. Baskins provides a blanket heater 64 for heating an optical base plate 63 "to maintain exact mechanical alignment of the various components located in the receiver housing, ..." (col. 8, lines 36-38) and another heater 66 to "maintain the frequency stability of the filters 56, 57, 58 and 59 (col. 8, lines 41-45). Accordingly, Baskins provides no suggestion to heat the optical window and/or the retroreflector.

New independent claim 29 includes the above-discussed limitations of amended claim 1 but is more specific than claim 1. Thus, claim 29 further recites that the retroreflector is releasably connected to the support member at a side of the support member remote from the optical window and aligned with an opening in the support member (as is also recited in dependent claim 2).

In Baskins the optical window is on the inside of a support member and not on the outside thereof where it can stay in place when the filter is removed. Baskins only teaches the overall construction of the probe to explain its function and is not concerned with structural features of the probe. As a result, Baskins does not teach or in any manner suggest the structural features recited in claim 29. Fig. 1 of Baskins, and the associated description, contains no suggestion to provide a connecting structure between a mounting structure and a support member which would permit the filter module to be removed sideways without disturbing the connection of the support member and the mounting structure and thereby the optical path between them. Equally, there is no suggestion in Baskins to mount the optical window so that it can be removed once the filter module has been removed, or that the retroreflector should be removable from the support member, as is recited in claim 29.

In view of the above, applicant submits that independent claims 1 and 29 are not obvious over Baskins, taken alone or in combination with the secondary references.

Claims 5-16 were rejected for obviousness over Baskins in view of Wieboldt.

Applicant initially observes that Wieboldt does not provide what is missing from Baskins relative to independent claims 1 and 29. As a result, claims 5-16 are allowable because they depend from an allowable parent claim.

In addition, claims 5-16 are independently patentable over Baskins in view of Wieboldt.

Wieboldt is concerned with an interface system for combining thermo gravimetric analysis and infrared spectrometry. The elongate tubular cell in the disclosed apparatus is a closed sealed body. There is nothing which suggests that a removable filter is present in the Wieboldt system. Wieboldt therefore relates to a different type of art from that of the present invention, and a person skilled in the art would not consider Wieboldt relevant to a gas permeable probe having a removable filter module.

Fig. 2 of Wieboldt was relied upon as showing the use of springs to mount optical components. Springs 74 of Wieboldt's Fig. 2 are used to resiliently support mirror 26 on a threaded connection rod 68. However, this arrangement is very different from the arrangement recited in claim 5 where just one spring is used to press the retroreflector into position. Thus, claim 5 is not obvious over Baskins in view of Wieboldt.

Finally, claim 28 was rejected over Baskins in view of Shu-Ti Lee or Bragg. Both references were viewed as teaching the use of bellows, thereby rendering claim 28 obvious.

As already pointed out, Baskins shows a gas permeable probe but provides essentially no structural details of the probe itself.

In the present invention, the optical path length is fixed and the bellows, which is placed between one of the first and second ends of the elongate hollow structure and the filter structure, is provided to take up differential thermal expansion without placing unnecessary

stress on any of the components. In addition, the flexible bellows functions as a type of spring and provides compensation for any tolerances or misalignment that may be present at the first and second ends of the elongate hollow structure, for example non-planarity or slight axial offset of the mounting faces at the first and second ends.

The bellows of Shu-Ti Lee and Bragg serve a quite different purpose from the bellows of the present application. Shu-Ti Lee is concerned with making spectroscopic measurements of stable isotopes. In the spectroscope described there, it is necessary to provide a variable optical path length for carrying out the measurement. The chamber 34 thus has windows 36 at its ends and a flexible bellows 38 in its middle section to allow longitudinal adjustment of the path length with a micrometer 42. Shu-Ti Lee contains no suggestion to provide a bellows for the purpose of compensating for different thermal expansions of the various components, nor how such compensation could be attained with a bellows. Bragg contains no disclosure regarding the bellows other than noting that one could be used without showing or describing how this could or should be done.

Thus, Baskins, with combined with Shu-Ti Lee and/or Bragg, does not suggest claim 28, and this claim is therefore independently not obvious over the references.

CONCLUSION

In view of the foregoing, applicant submits that this application is in condition for allowance and a formal notification to that effect at an early date is requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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